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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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RYAN & MASON LLP
90 FOREST AVENUE
LOCUST VALLEY, NY 11560

EXAMINER	
CHOW, CHARLES CHIANG	
ART UNIT	PAPER NUMBER
2685	10

DATE MAILED: 08/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No.	Applicant(s)
	09/396,055	SARRAF ET AL.
	Examiner	Art Unit
	Charles Chow	2685

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Office Action for
Applicant's Amendment
(7/7/2003)

1. Regarding applicant's amendment based upon the no teachings (page 3 of applicant's remark) for the transmitting signature sequence with data to a receiver, using a differential encoding for the signature sequence, the ground of rejection has been changed to include Rasky et al. (US 5,428,647).

Rasky et al. (also as Rasky in below) teaches transmitting signature sequence with data to receiver. Because Rasky teaches the method and apparatus for transmitting and receiving a synchronization for the purpose of synchronizing a receiver (abstract, figure in cover page, Fig. 1-6, col. 1, lines7-10; col. 2, lines 55-68; Fig. 7) from a synchronization information generator. Rasky teaches the differential encoding of the synchronization word (as shown in col. 4, lines 29-56; col. 4, lines 13-28; col. 4, lines 57-61). Rasky teaches a technique for improving synchronization for a receiver to reduce communication error (col. 2, lines 44-67) having differential encoding, such that the receiver can synchronize to the received word patterns with less error.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dejonghe (US 6,363,084) in view of Rakib et al. (US 6,307,868 B1), and further in view of Bohnke (US 6,160,791) and Rasky et la. (US 5,428,647).

Regarding **claim 1**, Dejonghe discloses, a method for estimating the frequency offset in an OFDM communication system (as shown in title; abstract; col. 1, lines 7-12; Fig. 1-4, for a method and apparatus for estimating coarse frequency offset within +/- 1/2 range, in OFDM receiver; and further in col. 2, line 24 to col. 3, lines 14, for obtaining the received reference signal inserted at L carrier positions in the symbols).

Dejonghe discloses the allocating certain locations to a signature sequence (Fig. 1, the locations allocated to reference signal sequence, R#0 to R#L-1, in the symbol, and the differential decoding in Fig. 2 for obtaining the reference signal information for frequency offset correction).

Djonghe discloses the transmitting said signature sequence with data to a receiver (the L reference signals is inserted in the fixed carrier positions using the phase shift keying, PSK, modulation, each of them contains the constant phase and amplitude. The remaining carrier positions are filled with data information using quadratue amplitude modulation, QAM).

Dejonghe discloses the estimating the frequency offset at said receiver (see above) by determining whether a correlated peak associated with said signature sequence is in an expected location (the +/- 1/2 intercarrier spacing, col. 2, line 26; the peak in Fig. 3A, Fig. 3B; the correlating within the expected predetermined maximum frequency offset, -S to +S,

and checking 2S+1 values, as shown above, in col. 2, line 35 to col. 3, line 14; the estimate a candidate offset value, col. 4, lines 63-67; col. 6, lines 62-67).

Dejonghe does not clearly indicate the detailed about the interleaver, although Dehonghe considered the carrier positions having the PSK modulation of the referencing signal and the QAM modulated data information (col. 3, lines 52-56).

Rakib teaches the interleaver in Fig. 14, 16 for a system for transmitting encoded master carrier and encoded master clock for headend modem transceiver, using orthogonal codes, for periodically adjusting the phase of the master carrier and master clock at central unit, title, abstract, Fig. 1, Fig. 9, Fig. 37). Besides, Rakib teaches the transmitting Barker code encoded carrier/clock signature sequence in between central unit and remote unit (col. 14, lines 27-20; col. 17, lines 14-20); the centering/fine tuning the window for Barker code (Fig. 36, 137); and the guard gap is reserved for the Barker code (col. 18, lines 57-67, col. 42, lines 22-23; and in Fig. 9, Fig. 13, Fig. 14, Fig. 16; col. 10, lines 5-15; col. 40, lines 57-67). It would be obvious to include Rakib's interleaver for adding the referencing Barker code in the guard gap, such that the referencing signal for frequency offset to be transmitted the receiver. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe, and to include Rakib's interleaver for allocating Barker code to guard gap, such that the referencing signal for correcting frequency offset could be transmitted to the receiver for frequency offset correction.

In the above, it does not include the amended portion for the OFDM frame, the data is

encoded using a differential encoding performed in frequency.

Bohnke teaches the transmitting, receiving of the power control information in the slot frame of the OFDM system using differential encoding method to modulate the data for the power control information (abstract). The information transmitted including the phase reference information (signature sequence) and the power control information (differentially encoded data) as shown in Fig. 1 and in Fig. 2, item 7 differential phase modulator , items 13-16, power control info. generation, power control symbol, phase reference symbol). The decoding process is shown in Fig. 4, item 26, 27, 29, 30, 37). The differentially encoded power control information (co. 1, lines 53-62). Bohnke teaches the demodulation of differentially encoded signal using phase reference (col. 3,lines 16-19; col. 7, lines 20-23; col. 8, lines 24-28). It would be obvious to include Bohnke's differentially encoded data, or received digital signal, of the power control information, for transmitting, receiving, long with phase reference, for achieving the closed loop power control purpose, such that the OFDM carriers' power control could be efficiently controlled using Bohnke's solution. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe above, and include Bohnke's differentially encoded data, or received digital signal, of the power control information, for transmitting, receiving, along with phase reference, for achieving the closed loop power control purpose, such that the OFDM carriers' power control be controlled efficiently (col. 1, lines 29-46).

Regarding for the transmitting signature sequence with data to a receiver, using a differential encoding for the signature sequence,

Rasky teaches transmitting signature sequence with data to receiver. Because Rasky teaches the method and apparatus for transmitting and receiving a synchronization for the purpose of synchronizing a receiver (abstract, figure in cover page, Fig. 1-6, col. 1, lines7-10; col. 2, lines 55-68; Fig. 7) from a synchronization information generator. Rasky teaches the differential encoding of the synchronization word (as shown in col. 4, lines 29-56; col. 4, lines 13-28; col. 4, lines 57-61). Rasky teaches a technique for improving synchronization for a receiver to reduce communication error (col. 2, lines 44-67) having differential encoding, such that the receiver can synchronize to the received word patterns with less error.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe above, and to include Rasky synchronization words and differential encoding, such that the receiver could synchronize to the received patterns with less error.

Regarding **claim 2**, Dejonghe discloses the last column is allocated for referencing signals for frequency offset correction, as shown above in Fig. 1/Fig. 2, that the data information is in front of the referencing signals, R#0 to R# L-1. Rakib also teaches the dedicated time slot is allocated to the Barker code sequence (col. 17, liens 19-20), and guard gap is assigned for Barker code.

Regarding **claim 3**, Dejonghe discloses the receiving of the transmitted referencing signal over L number of bin fixed carrier position using the PSK, as shown above in claim 1. The PSK would provided the modulated upper/lower side band having the referencing signals.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dejonghe in view of Rakib, Bohnke, Wood, as applied to claim 1 above, and further in view of Ohkubo et al. (US 6,151,369).

In the above, it does not clearly indicate the feedback technique.

Regarding **claim 4**, Ohkubo teaches the frequency offset correction in the OFDM system for demodulating the coded phase-reference symbol contained in an orthogonal frequency division multiplexed signal (abstract), for frequency error correction of the VCO 10 using the feedback path from the output of the FFT processor 7 to the VCO 10, via frequency error detector 101. It would be obvious to include Ohkubo's feedback frequency error correction, such that at least the basic error correction loop could be formed, using the known essential feedback technique, to correct and control the carrier frequency error. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe, and to include Ohkubo's frequency error correction feeding back to VCO, such that the at least the system could using the feedback technique to correct the carrier offset.

4. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dejonghe in view of Rakib, Bohnke, Wood, as applied to claim 1 above, and further in view of Klank et al. (US 6,226,337 B1).

In the above, it does not clearly indicate the forward error correction techniques.

Regarding **claim 5**, Klank teaches the method for transmission digital frames using multiple modulated carriers having the given reference frequency pattern to correct frequency deviation in the oscillator in an OFDM system (title, abstract). In Fig. 3, col. 6, lines 19-38, Klank teaches the feed forward error correction using evaluation 15, digital sync 16 to generate clock signal 18 for demodulating the OFDM data in OFDM 17. It would be obvious to include Klank's evaluation/digital synchronization blocks in a forward error correction path, such that the oscillator frequency could be efficiently corrected in parallel with the data demodulation path. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe above, and to include Klank's error evaluation/digital synchronization function blocks in a forward error correction path in parallel with data demodulation, such that the oscillator error correction could be efficiently performed in parallel with data demodulation using the feed forward error correction.

Regarding **claims 6, 7,** Rakib has shown above, in Fig. 9, 13, 14, 16, col. 10, lines 5-15; col. 40, lines 57-67; col. 42, lines 22-32; ranging window Fig. 70; it shows after the data interleaver memory is full with blocks (334, 336, 338), then, the insertion of the Barker code information is delayed for delays t_d by the interleaver after the memory is completely filled with blocks of data , in order to insert the Barker code information in the guard gap. Thus, for L number of blocks and at the end of the memory full, delay for t_d times, then the Barker code signature sequence is transmitted every time the memory is full, in the guard gap position, allocated for the Barker code information.

Regarding **claim 8,** Rakib has shown above the delay time t_d for transmitting the Barker code in the guard gap (col. 10, lines 5-15; col. 40, lines 57-67; col. 42, lines 22-32). The delay time t_d would cause the effect of delay from one side band to the other side band because of the SDMA differential phase shift key DPSK modulation (col. 2, line 12, Fig. 44), the delay of the Barker code in time would cause the frequency shift in the side band.

Regarding **claim 9, 10,** Rakib has shown above, the delay time for centering the Barker code in the guard gap, and in col. 27, line 44; col. 28, lines 3-13, Rakib considers the fine tuning of positioning the Barker code in the guard gap window.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dejonghe in view of Rakib, Bohnke, Wood, as applied to claim 1 above, and further in view of van Nee (US 6, 404,732).

In the above, it does not clearly indicate the very low side-lobe.

Regarding **claim 11**, van Nee teaches the digital modulation system which provides the enhanced multipath performance by using the modified orthogonal codes such that the autocorrelation side lobes would be reduced to the possible level during the correlation. The M codes for autocorrelation is the complementary Barker code received in the orthogonal codes autocorrelation (as shown in abstract, col. 1, lines 62-67; col. 3, lines 40-53; col. 6, lines 16; col. 4, lines 60-66; the complementary Barker code has low sidelobes). It would be obvious to include van Nee's modified complementary Barker code, such that the system could efficient of having the high level of autocorrelation because of the low

autocorrelation side lobes (col. 1, lines 62-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Dejonghe above, and to include van Nee's reduced low autocorrelation side lobes using modified complementary Barker code, such that the system could be efficient of having high on the autocorrelation by reducing the autocorrelation side lobes,using the modified complementary Barker code.

6. Claims 12-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dejonghe in view of Rakib, Bohnke, Wood, as applied to claim 1 above, and further in view of Ohkubo, Klank, and van Nee.

Regarding **claim 12**, referring to the examiner's comment in claim 1 above, for the method for estimating frequency offset using referencing signature PSK sequence; the Barker code encoded carrier/clock information in the guard gap of Rakib; the correlating of the received signal for the peak I_{M1}, I_{M2}, in Fig. 3A, Fig. 3B of Dejonghe; and the identifying whether the correlated peak is an expected location, as shown above from Dejonghe. Rakib teaches the matched filter using the matched coefficients for the filter as shown in Fig. 33, filter 563; col. 28, lines 8-13). Regarding the amended portion, referring to the examiner's comment in claim 1 above, for the received digital signal is encoded using a differential encoding performed in frequency.

Regarding the amended portion for differential encoding signature sequence and data, referring to claim 1 above, from Wood.

Regarding **claim 13**, referring to examiner's comment in claim 2 above, for the signature Barker code encoded sequence, which is stored in the memory last column (guard gap) of the block (frame) interleaver. (Beside, Rakib's frame contains plurality of blocks, as shown above.)

Regarding **claims 14, 24**, referring to examiner's comment in claim 3 above, for the over upper and lower side bands of the phase shifted keying side bands.

Regarding **claim 15**, referring to examiner's comment in claim 4 above, for the feed back technique, as shown in Ohkubo.

Regarding **claim 16**, referring to examiner's comment in claim 5 above, for the forward error correction technique, as shown above from Klank.

Regarding **claims 17, 25**, referring to examiner's comment in claims 6, 7 above, for the receiver and the signature sequence is received every L data frames that can fill the interleaver memory.

Regarding **claims 18, 26**, referring to examiner's comment in claim 1 above, for the interleaver memory is full.

Regarding **claim 19**, referring to examiner's comment in claim 8 above, for the delayed from the other side band.

Regarding **claim 20**, referring to examiner's comment in claim 9 above, for the maintaining the signature sequence in the center of the search window.

Regarding **claims 21,28**, referring to examiner's comment in claim 11 above, for the low side band from van Nee's reduced autocorrelation sidelobes.

Regarding **claim 22**, referring to examiner's comment in claim 8 above, for the delayed from the other side band. Regarding the amended portion for differential encoding signature sequence and data, referring to claim 1 above, from Wood.

Regarding **claim 23**, referring to examiner's comment in claim 2 above, for the signature sequence is stored in last column of block interleaver.

Regarding **claim 27**, referring to examiner's comment in claim 8 above, for the delayed from the other side band.

Regarding **claim 29**, referring to examiner's comment in claim 12 above, for the CU/RU receiver in Fig. 30-31 and the matched filter coefficients from Rakib; the frequency Dejonghe's estimate frequency offset peakes $I_{M1,M2}$ at the expected L number of locations; Besides Rakib also teaches the autocorrelation of Barker code in the guard gap expected location, as shown above.

Regarding the previously amended portion, referring to the examiner's comment in claim 1 above, for the received digital signal is encoded using a differential encoding performed I frequency.

Regarding **claim 30**, referring to examiner's comment in claims 1, 12, 22, 29 above, for the receiver, the receiving of the signature Barker coded sequence; the matched filers for autocorrelation; the interleaver synchronization to identifies the beginning of the interleaver block from Klank's Fig. 1, that the signature frequency pattern is transmitted at the beginning of the block in the OFDM system, as shown above.

Regarding the amended portion, referring to the examiner's comment in claim 1 above, for the received digital signal is encoded using a differential encoding performed I frequency.

Response to Arguments
And
Conclusion

7. Applicant's arguments with respect to claims 1-30 have been considered but are moot in view of the new ground(s) of rejection.

Regarding applicant's argument based upon the no teachings (page 3 of applicant's remark) for the transmitting signature sequence with data to a receiver, using a differential encoding for the signature sequence, the ground of rejection has been changed to include Rasky et al. (US 5,428,647).

Rasky teaches transmitting signature sequence with data to receiver. Because Rasky teaches the method and apparatus for transmitting and receiving a synchronization for the purpose of synchronizing a receiver (abstract, figure in cover page, Fig. 1-6, col. 1, lines7-10; col. 2, lines 55-68; Fig. 7) from a synchronization information generator. Rasky teaches the differential encoding of the synchronization word (as shown in col. 4, lines 29-56; col. 4, lines 13-28; col. 4, lines 57-61). Rasky teaches a technique for improving synchronization for a receiver to reduce communication error (col. 2, lines 44-67) having differential encoding, such that the receiver can synchronize to the received word patterns with less error.

In view of the disclosures from the cited prior arts, claims 1-30 are remaining in the rejection manner.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Chow whose telephone number is (703)-306-5615.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,

Edward Urban, can be reached at (703)-305-4385.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

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or faxed to: (703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Charles Chow

Charles Chow

August 16, 2003.